

**IMPROVEMENT TO DENTAL POWER INSTRUMENTS, SUCH AS
ENDODONTIC INSTRUMENTS, AND CONTRA-ANGLE HANDPIECE**

The present invention relates to an improvement to dental power instruments such as endodontic
5 instruments, and a contra-angle drive apparatus or handpiece designed to accommodate such instruments removably.

Dental power instruments are usually provided, at the opposite end to the active part of the instrument, with
10 a handle designed to engage with a revolving guiding and gripping device situated inside the head of the handpiece. Said handle also comprises a flat designed to engage with a combined profile of a rotary drive device housed in the head of the contra-angle to
15 connect the handle to the rotary drive device.

With such an instrument handle gripping device there is usually a control means such as a pushbutton or guillotine means controllable by the user. The handle of the instrument is also immobilized axially in the
20 head of the contra-angle by a device on the rotating part of the contra-angle which fits into a groove in the handle of the instrument.

Such a system for fixing the instrument handle in the head of the contra-angle requires a great many
25 mechanical parts, which means that the cost of manufacture is high.

Another issue is that in order to mount the dental instrument in or remove it from the head of the contra-angle, the practitioner is obliged to hold the
30 instrument by its active part. This means that there is a risk of contaminating the active part of the instrument and even of injury to the practitioner by stabbing himself, for example.

The object of the invention is to provide an improvement to such dental instruments that solves all or some of the aforementioned problems by providing an inexpensive way of fitting the instrument to the head
5 of a handpiece shaped to receive such an instrument, while also reducing the risk of contamination to the active part of the instrument and of injury to the practitioner.

To this end, the present invention relates to a dental
10 power instrument, particularly an endodontic instrument, consisting of an active part and, at the opposite end to said active part, a handle, which instrument is characterized in that said handle of the dental instrument is provided with a rotary drive means
15 capable of meshing directly, when mounted in a head of a handpiece, with a rotary drive means situated upstream of the head of the handpiece, said drive means being retractable independently of said drive means of the head of the handpiece, and said drive means having
20 the same direction of rotation as the drive means of the head of the handpiece.

Another advantageous feature of the present invention is that the dental power instrument also comprises a shoulder close to the rotary drive means, on the side
25 nearest the active part of the instrument. With such a shoulder, the instrument handle can be raised when placed on a dispenser, thus facilitating the engagement of the instrument in the head of a handpiece.

Another feature of the invention is that the drive
30 means located on the handle is a pinion.

The present invention also relates to a head of a handpiece for a dental instrument as described above, characterized in that it is provided with a bore forming the housing of the handle for a dental
35 instrument and with a means of retractable axial

retention of the handle of the instrument capable of being operated by the practitioner.

5 An advantageous feature of the present invention is that the retractable retention means consists of a part projecting across the opening of the housing. This projecting part is also connected to a ring that can be moved against the action of a restoring spring and that is mounted concentrically on the outer periphery of the body of the head.

10 Another feature is that said projecting part also comprises on its outer face a retraction slope designed to engage with a combined profile on the handle of the dental instrument so that when the handle is inserted into the head of the handpiece, the combined profile of
15 the handle causes the retention means to retract.

Another feature of the invention is that the projecting part also comprises a horseshoe profile so as completely to fit the shape of a shoulder formed on the dental instrument.

20 In an alternative embodiment of the invention, the retention means is a split spring ring arranged on the head of the handpiece in such a way that the ends of the split ring project in the rest position into the mouth of the opening of the housing of the handle of
25 the instrument. This ring is also retractable under the action of a pushbutton located on top of the head.

In this alternative embodiment, each of the ends of the split ring is provided with a retraction slope, these retraction slopes being designed to engage with the end
30 of the handle of the instrument so as to push back and allow access to the housing of the head.

Yet another advantageous feature is that each end of the split ring also comprises a horseshoe profile so as

completely to fit the shape of a shoulder formed on the dental instrument.

The present invention also relates to a dispenser of dental instruments as described above, comprising a plurality of instrument housings, characterized in that it also comprises a cover situated above the instruments containing an opening designed to allow the head of the contra-angle to be engaged onto the handle of an instrument and in that said cover can be turned manually to position its opening over an instrument and has a means of indexing the opening of the cover over each position of an instrument.

The features of the invention indicated above, and other features too, will be made clearer by the following description of an illustrative embodiment, reference being made to the appended drawings in which:

- figures 1 and 2 are side views of two dental power instruments according to the present invention,
- figure 3 is a cross section through a head of a handpiece designed to accommodate a dental instrument according to the present invention,
- figure 4 is a view similar to figure 3 illustrating an alternative embodiment of the head of a handpiece equipped with an instrument according to the invention,
- figure 5 is a cross section taken on the line marked V-V in figure 4, and
- figures 6 and 7 are, respectively, a side view of an endodontic dispenser capable of accommodating a plurality of dental instruments according to the invention, and a top view looking in the direction of the arrow F in figure 6.

Figures 1 and 2 show two types of dental power endodontic instruments 1. Each of these instruments consists, as in the prior art, of an active part 2 and, at the opposite end to said active part 2, a handle 3.

According to the present invention, said handle 3 of the dental instrument 1 is provided with a rotary drive means 4 meshing, when mounted in the head 5 of the handpiece, directly with a rotary drive means situated upstream of the head of the handpiece and not shown in figures 3 and 4.

This drive means 4 located on the handle 3 is advantageously a pinion, with for example straight cut teeth, capable of engaging with a drive pinion (not shown) located inside the body 6 of the handpiece in the vicinity of the head and mounted on a shaft transmitting the rotational movement of the mechanical members upstream of the contra-angle into a rotational movement of the instrument 1.

The profile of the pinion of the drive means located on the handle and that of the drive pinion in the head enable them to mesh with no other operation than insertion of the instrument into the head of the contra-angle.

Furthermore, the point of contact between these two pinions occurs at the bottom of the driving pinion, producing a right rotation of the driven shaft, thus allowing the drive means on the handle and the drive means in the head to have an identical direction of rotation.

It will be observed that this pinion 4 can be produced by overmolding or assembled onto the instrument or made in one piece with the instrument.

Figure 3 shows a head 5 of a handpiece shaped in such a way that the dental instrument 1 described above can be fitted to and removed from it.

To do this, this head 5 is provided with a bore 7 constituting the housing of the handle 3 of the

instrument 1 and with a means 8 of retractable axial retention of the handle 3 of the instrument 1 capable of being operated by the practitioner.

In a first embodiment, this retractable retention means
5 8 consists advantageously of a part 8a projecting across the opening of the housing 7 in a general horseshoe shape designed to engage with a surface 13 on the handle 3 approximately perpendicular to the axis of the instrument 1.

10 This projecting part 8a is integral with a ring 9 mounted concentrically on the outer periphery of the body 6 of the head. This ring 9 can be moved axially against the action of a restoring spring 10 housed between the connecting collar 11 of the handpiece and
15 the body 6 of the head.

This projecting part 8a also comprises on its outer face a retraction slope 12 designed to engage with a combined profile formed on the end of the handle 3 of the dental instrument 1 in such a way that when the
20 handle 3 is inserted into the head 5 of the handpiece, the combined profile of the handle 3 causes the retention means 8 to retract. The latter 8 repositions itself in its rest position because of the restoring spring 10 as soon as the drive means 4 is engaged in
25 the head 5 and engages with the face 13 perpendicular to the instrument 1 to keep the dental instrument 1 in the head 5.

The fitting and removal of a dental power instrument 1 will already be clear from the above description and
30 will now be explained.

As will be appreciated, fitting a dental instrument 1 to the head 5 of a handpiece is a very simple operation involving simply presenting the head 5 over the top of the handle 3 of the instrument and pressing the head 5

down onto the handle 3 of the instrument 1 so that the pressure forces the slope 12 of the retention means 8 to engage with the combined profile of the handle 3, so pushing back the retention means 8 against the action
5 of the restoring spring 10.

When the drive means 4 of the instrument 1 is fully engaged in the housing 7 of the head 5, the narrowing of the diameter of the handle 3 automatically allows the restoring spring 10 to extend the retention means 8
10 as shown in figure 3. When installed in this way, the pinion 4 forming the drive means meshes automatically with a driving pinion (not shown).

Removal of the dental instrument is just as simple: the practitioner grips the ring 9 to which the retention
15 means 8 is connected in order to draw it back against the restoring spring 10, thus releasing the opening 7 of the housing of the head 5 of the handpiece. The instrument 1 is automatically disengaged from the handpiece by gravity.

20 As will be appreciated, this arrangement of an instrument 1 in a contra-angle head 5 makes unnecessary almost all the parts contained in the head of a conventional contra-angle, so greatly reducing the cost of manufacture and offering a reduction in the size of
25 a head of a contra-angle. This size reduction also makes for better visibility when the instrument is in use.

Shown in figures 4 and 5 is an alternative embodiment of the means 8 of retention of the instrument in the
30 head of the handpiece.

This retention means 8 is a split spring ring 20 arranged on the head 5 of the handpiece in such a way that the ends 20a and 20b of the split ring 20 in the rest position project into the mouth of the opening 7

of the housing of the handle of the instrument. The ends 20a and 20b of this ring 20 are retractable by elastic deformation under the action of a pushbutton 22 located on top of the head. This pushbutton 22 bears on
5 the split ring 20 in such a way that pressure on the button allows access to the housing of the instrument handle.

So that the ends 20a and 20b of the split ring 20 retract automatically when the handle of an instrument
10 is inserted, each end of the split ring is provided with a retraction slope 23 and 24, as visible in figures 4 and 5. These retraction slopes 23 and 24 are able to engage with the end of the handle 3 in order to be pushed back and allow access to the housing 7.

15 In a similar way to the first embodiment, the split ring 20 repositions itself automatically as soon as the meshing pinion 4 mounted on the handle 3 is fully housed inside the head 5. The ends 20a and 20b of the split ring 20 now rest against the underside 13 of the
20 pinion 4.

It will be observed that each end 20a and 20b of the split ring 20 also comprises a horseshoe shape so as completely to fit the shape of a shoulder 25 formed underneath the meshing pinion 4. The function of this
25 shoulder 25 will be described in more detail below.

An instrument 1 is fitted and removed in much the same way as described in relation to the first embodiment with the exception that the practitioner applies pressure to the pushbutton 22 to release the dental
30 instrument 1 from the head 5 of the contra-angle.

Advantageously, it will be observed that each dental instrument 1 also comprises a shoulder 25 (or 26 in an alternative embodiment, figure 1) located in the vicinity of the meshing pinion 4, on the side nearest

the active part 2 of the instrument. This shoulder 25 advantageously means that the dental instrument is raised when positioned on a dispenser 30, or tray as it is also known, as visible in figure 6, thus allowing the retention means 8 of the head 5 of the handpiece to be engaged without practitioner intervention.

Specifically, the practitioner can load an instrument into the head simply by resting the head on top of the handle. It therefore does not have to touch the instrument, which will have been sterilized.

The dispenser 30 of dental instruments 1 comprises a plurality of housings 34 for instruments 1 according to the invention and may advantageously comprise a cover 31 situated above the instruments. This cover 31 has an opening 32 designed to allow the head 5 of the contra-angle to be engaged onto the handle 3 of an instrument 1.

Said cover 31 can also be turned manually by the practitioner to position its opening 32 over an instrument 1 and for this purpose has a means 33 of indexing the opening of the cover over each position of an instrument 1.

To this end, in one particular embodiment, the cover 31 is a surface approximately perpendicular to the instruments 1 when arranged in the dispenser 30. This surface is in the shape of a circle whose center is extended by a spindle 35 designed to fit in a housing 36 in the center of the dispenser 30. In the approximate vicinity of the free end of this spindle 35 is the means 33 of indexing the opening 32 of the cover 31 over each position of an instrument 1. This indexing means 33 may take the form of a leaf spring capable of engaging in a slot formed at a position corresponding to an instrument. The leaf spring can be disengaged from said slot by the practitioner simply rotating the

cover.

Although the invention has been described in connection with certain particular embodiments, it encompasses all technical equivalents of the means described.